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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,036	10/11/2005	Minoru Mizusawa	278647US3PCT	6685

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EXAMINER	
MERKLING, MATTHEW J	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/17/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/553,036	MIZUSAWA ET AL.	
	Examiner	Art Unit	
	MATTHEW J. MERKLING	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo et al. (US 6,413,479) in view of Miura et al. (WO 02/098790 A1, with English language equivalent US 2004/0144029 A1) and Pham et al. (US 7,297,169).

Regarding claims 20, 21, 23 and 24, Kudo discloses a method for starting a fuel reforming apparatus (col. 7 lines 12-18) wherein an assembled unit of a reformer has associated instruments (Fig. 23A), an interior of said vessel being utilized as a flow path of combustion gas for the reformer (see flow path of combustion exhaust gas in Fig. 23A), comprising:

burning startup fuel so that resultant combustion gas from said burnt startup fuel is heat exchanged with the reformer and is guided to said flow path while being still hot, whereby the combustion gas flows around and heats the shift converter and the CO remover (see col. 21 lines 5-63 which discuses the operation of the reformer during a startup phase);

said reformer comprises

a furnace flue (such as flue gas from combustion chamber 1) arranged centrally inside the vessel (see Figs. 21-26) configured to flow the combustion gas from a combustor therethrough; and

a reforming zone (2) and charged with reforming catalyst (col. 10 line 66 - col. 11 line 6) configured to flow a source gas therethrough (such as raw material and steam, see Fig. 21 and 22) for reforming of the source gas, and said associated instruments of the reformer include

a water vaporizer (6b) configured to vaporize water into water vapor through heat of the exhaust gas from the reformer (col. 15 lines 13-23 and col. 20 lines 25-29);

a low-temperature shift converter (3, col. 8 lines 33-37) configured to lower the gas reformed by the reformer to a required temperature so as to transform CO and H2O into CO2 and H2 (water gas shift reaction), and

a CO remover (4) configured to cool the reformed gas having passed through the shift converter so as to remove CO (col. 10 lines 36-42).

Kudo does not explicitly disclose that during startup, a primary fuel is not sent to the reformer. However, Kudo does disclose that prior to reaching an activation temperature,

the reformer, shift reactor and CO remover do not produce a reformed gas (col. 21 lines 54-63). As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to not flow primary fuel through the reformer prior to the reformer reaching a temperature in which a reformed gas is actually produced, thereby saving the cost of primary fuel.

Furthermore, while Kudo teaches an apparatus in which a vessel contains a reformer along with several associated instruments, Kudo does not explicitly disclose an assembled unit of a reformer with its associated instruments is covered with and enclosed by a vessel to form a heat insulating layer therearound.

Miura also discloses an apparatus in which a reformer is contained in vessel along with several associated instruments (see abstract, Fig. 1).

Miura teaches the vessel containing a heat insulating layer (34) on the outside in order to prevent heat dissipating to the outside (paragraph 44).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the heat insulating layer of Miura on the vessel of Kudo in order to prevent heat dissipating to the outside.

In addition, Kudo does not explicitly disclose a configuration of the reforming tubes in which there are a plurality of them in a side by side arrangement in the flow path of the combustion gas between the furnace flue and the vessel. Instead, Kudo teaches a configuration in which the reforming zone (which is not a tube, but rather a cylinder, see Figs. 21 and 22) only contacts the combustion heat source on one side (see Figs. 21 and

22 where the reforming zone 2 only contacts the combustion heater on the inside wall of the cylinder).

Pham also discloses a fuel reforming apparatus (see abstract).

Pham teaches a fuel processor which comprises a configuration where a plurality of reforming tubes (such as 26 or 226) that comprise an inner tube and an outer tube (see Fig. 8 and col. 7 lines 32-40). Pham teaches this configuration of an inner tube and an outer tube in order to utilize the heat of the product gas from the reforming reaction to supply heat to the reforming catalyst (col. 7 lines 32-40). In addition, the configuration of Pham, where a plurality of reforming tubes are arranged side by side in the flow path of a combustion gas provide more surface area for heat transfer and provide for a more efficient means to transfer heat to the reforming reaction (see abstract).

As such, it would have been obvious to one of ordinary skill to replace the reforming zone of modified Kudo with the plurality of side by side reaction tubes and the inner and outer tube arrangement of Pham in order to provide more surface area for heat transfer between the combustion flue gas and the reforming reaction.

Regarding claims 22 and 25-27, Kudo, as modified above, teaches a number of configurations regarding the locations of the water vaporizer, the reformer, the shift converter and the CO remover with respect to each other, but Kudo does not explicitly discloses a configuration wherein the reformer is disposed above the water vaporizer, the water vaporizer is disposed above the shift converter, and the shift converter is disposed above the CO remover.

However, the exact location of each element/instrument relative to each other (above, below, etc.) and the associated direction of flow from one instrument to the other is not considered to confer patentability to the claims. As the heat transfer properties and efficiencies are variables that can be modified by adjusting the location of each unit with respect to the other (as is evidenced by the numerous configurations suggested by Kudo, see Figs. 21-27 and col. 3 lines 8-24), the precise location of each instrument would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed location of each instrument relative to the other cannot be considered critical. Accordingly, one of ordinary, skill in the art at the time the invention was made would have optimized, by routine experimentation, the location of each instrument relative to the other (and subsequently the associated direction of flows) of Kudo to obtain the desired heat transfer efficiencies (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)). Since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Response to Arguments

4. Applicant's arguments filed 6/30/09 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment. Applicant states several arguments, but all are directed toward the new limitations that have been added to the claims and are properly addressed in the rejections above.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1795
/Jennifer K. Michener/
Supervisory Patent Examiner, Art Unit 1795